

عنوان مقاله:

Impact of Loading Rate in Hot Tube Gas Forming of AA6063

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خلاصه مقاله:

In this paper, the manufacturing of a cylindrical AA6063 step tube via hot metal gas forming (HMGF) process is studied both experimentally and numerically. The goal is to investigate the effect of loading rate on the specimen profile and thickness distribution. ABAQUS finite element software is used for the numerical simulation. Experiments were carried out at 580°C in two conditions; first, without axial feeding and then with an axial feeding of 14 mm at a maximum pressure of 0.5 MPa. The studied parameters are the pressure rate and the axial feeding rate. The results show that in the non-axial feeding mode, the thickness distribution in the die cavity region was non-uniform and a rupture occurred at a pressure of 0.6 MPa. The reduction of the pressure rate has no significant effect on the rupture pressure. In the case of axial feeding, by choosing the pressure rate of 0.001 MPa/s and the axial feeding rate of 0.1 mm/s, wrinkling has been created in the specimens. However, at a pressure rate of 0.005 MPa/s and an axial feeding rate of 0.02 mm/s, the specimens are ruptured. Under low pressure rate of 0.001 MPa/s and low axial feeding rate of 0.02 mm/s, the thickness in the die cavity area has decreased. A suitable die filling and thickness distribution are obtained at a pressure rate of 0.005 MPa/s and axial feeding rate of 0.1 mm/s.

کلمات کلیدی:

AA6063, Hot Metal Gas Forming, Loading Rate, Tubular Parts

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